CLAIMS:

1. An isolated nucleic acid obtainable from the VRN2 locus of a plant, which nucleic acid encodes a polypeptide which is capable of affecting one or more physical characteristics of a plant into which the nucleic acid is introduced, the physical characteristics being selected from vernalization response, flowering time, leaf size and/or shape or shade avoidance response.

2. A nucleic acid according to claim 1 which is capable of reducing the vernalization requirement of the plant for flowering.

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3. A nucleic acid according to claim 1 or claim 2 which comprises a VRN2 nucleotide sequence which encodes a polypeptide of SEQ ID No. 2.

4. A nucleic acid according to claim 3 wherein the VRN2 nucleotide sequence consists of the sequence of SEQ ID No. 1 or is degeneratively equivalent thereto.

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5. A nucleic acid according to claim 1 or claim 2 which comprises a VRN2 nucleotide sequence which encodes a polypeptide of SEQ ID No. 5.

6. A nucleic acid according to claim 5 wherein the VRN2 nucleotide sequence consists of the sequence of SEQ ID No. 4 or is degeneratively equivalent thereto.

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7. A nucleic acid according to claim 1 or claim 2 which comprises a VRN2 nucleotide sequence which encodes a polypeptide of SEQ ID No. 8.

8. A nucleic acid according to claim 7 wherein the VRN2 nucleotide sequence consists of the sequence of SEQ ID No. 7 or is degeneratively equivalent thereto.

9. An isolated nucleic acid obtainable from the VRN2 locus of a plant which nucleic acid comprises a nucleotide sequence of SEQ ID No. 3 or SEQ ID No. 6, or a nucleic acid degenerative equivalent thereof.

10. A nucleic acid according to claim 9 which comprises a sequence having promoter and/or regulatory function.

11. An isolated nucleic acid which comprises a variant sequence which is a homologous variant of a nucleotide sequence of any one of claims 4, 6 , 8, 9 or 10 and which shares at least about 50% identity therewith.

12. A nucleic acid according to claim 11 wherein the variant sequence is capable of capable of affecting one or more physical characteristics of a plant into which the nucleic acid is introduced, the physical characteristics being selected from vernalization response, flowering time, leaf size and/or shape or shade avoidance response

13. A nucleic acid according to claim 11 or claim 12 wherein the variant is an allelic variant of a nucleotide sequence of any one of claims 4, 6, 8, 9 or 10, or is a nucleic acid degenerative equivalent thereof.

14. A nucleic acid according to claim 11 or claim 12 wherein the variant sequence is a VRN2 sequence obtainable from a plant species other than Arabidopsis thaliana.

15. An isolated nucleic acid sequence which comprises a derivative of a nucleotide sequence of any one of claims 4, 6, 8, 9 or 10, which is a derivative by way of one or more of addition, insertion, deletion or substitution of a said nucleotide sequence and wherein the derivative sequence is either capable of affecting one or more physical characteristics of a plant into which the nucleic acid is introduced, the physical characteristics being selected from vernalization response, flowering time, leaf size and/or shape

or shade avoidance response or has promoter and/or regulatory function.

16. An isolated nucleic acid which comprises a sequence which is a fragment of a sequence of any one of claims 1 to 15 and either is capable of affecting one or more physical characteristics of a plant into which the nucleic acid is introduced, the physical characteristics being selected from vernalization response, flowering time, leaf size and/or shape or shade avoidance response or has promoter and/or regulatory function.

17. An isolated nucleic acid which comprises a sequence which is the complement of a sequence of any one of claims 1 to 16.

18. An isolated nucleic acid for use as a probe or primer which comprises a sequence that encodes an amino acid sequence that is partly, substantially or completely conserved between a VRN2 sequence of SEQ ID Nos. 2, 5 or 8 and at least one of the other sequences shown in Figure 8a or 8b.

19. An isolated nucleic acid for use as a probe or primer which comprises a sequence that is partly, substantially or completely conserved between two or more of the VRN2 nucleotide sequences of claim 4, 6,8 9 or 10 or the complements thereof.

20. A nucleic acid according to claim 18 or claim 19 which is 15 to 40 nucleotides in length.

21. A nucleic acid according to claim 20 which is 19 to 28 nucleotides in length.

22. A pair of primers each comprising a nucleic acid according to any one of claims 18 to 21.

23. A pair of primers according to claim 22 which is selected from:

VRN2-AP and VRN2-AJ;

VRN2-AO and VRN2-AS; and

VRN2-AI and VRN2-AJ.

24. A process for producing a nucleic acid which is a derivative according to claim 15 which process comprises the step of modifying

25. A method for identifying or cloning a nucleic acid according to any one of claims 1 to 17, which method comprises using a nucleotide sequence of a probe or primer of claim 18 or 19 in a database search.

26. A method for identifying or cloning a nucleic acid according to any one of claims 1 to 17, which method employs a probe or primer according to any one of claims 18 to 21 or a pair of primers according to claim 22 or 23.

27. A method for determining the presence of a nucleic acid according to any one of claims 1 to 17 within the genetic make-up of a plant, which method employs a probe or primer according to any one of claims 18 to 21 or a pair of primers according to claim 22 or 23.

28. A method according to claim 26 or claim 27, which comprises the steps of:

(a) providing a preparation of nucleic acid from a plant cell;

(b) providing a nucleic acid molecule which is a probe according to any one of claims 19 to 21;

(c) contacting nucleic acid in said preparation with said probe under conditions for hybridisation; and

(d) identifying a nucleic acid according to any one of claims 1 to 17 if present by its hybridisation with said nucleic acid probe.

29. A method according to claim 26 or claim 27, which method comprises the steps of:

(a) providing a preparation of nucleic acid from a plant cell;

(b) providing a pair of nucleic acid molecule primers suitable for PCR, at least one of said primers being a primer of any one of claims 18 to 21;

(c) contacting nucleic acid in said preparation with said primers under conditions for performance of PCR;

(d) performing PCR and determining the presence or absence of an amplified PCR product.

30. A method according to claim 29 wherein the pair of nucleic acid molecule primers are according to claim 22 or claim 23.

31. A method of selecting a plant having a desired allele of the VRN2 gene, which method employs a probe or primer according to any one of claims 18 to 21 or a pair of primers according to claim 22 or 23.

32. A recombinant vector which comprises the nucleic acid of any one of claims 1 to 17.

33. A vector according to claim 32 wherein the nucleic acid comprised in the vector is capable of regulating one or more genes involved in the transition from vegetative to reproductive growth and/or capable of regulating one or more genes involved in the determination of leaf size and/or shape.

34. A vector according to claim 32 or claim 33 wherein the nucleic acid is operably linked to a promoter for transcription in a host cell, wherein the promoter is optionally an inducible promoter.

35. A vector according to claim 34 wherein the promoter is a constitutive promoter.

36. A vector according to any one of claims 32 to 35 which is a plant vector.

37. A method which comprises the step of introducing a vector according to any one of claims 32 to 36 into a host cell such as to transform the host cell.

38. A host cell which is transformed with a heterologous nucleic acid of any one of claims 1 to 17.

39. A host cell according to claim 38 which is a plant cell, optionally present in a plant.

40. A method for producing a transgenic plant, which method comprises the steps of:

(a) performing a method according to claim 37

(b) regenerating a plant from the transformed host cell.

41. A transgenic plant which is obtainable by the method of claim 40, or which is a clone, or selfed or hybrid progeny or other descendant of said transgenic plant, which in each case includes the plant cell of claim 39.

42. A plant according to claim 41 which is an agricultural or horticultural plant.

43. A plant according to claim 41 or claim 42 selected from the list consisting of: rice, maize, wheat, barley, oats, rye, oil seed rape, sugar beet, sunflower, soybean, sorghum, lettuce, endive, cabbage, broccoli, cauliflower, carnation, geranium, tobacco, cotton, canola, tomato, mango, peach, apple, pear, strawberry, banana, melon, carrot, onion, pea, celery.

44. A plant according to claim 43 which is selected from tobacco, oil seed rape, rice and wheat.

45. A part or propagule from a plant according to any one of claims 41 to 44, which includes the plant cell of claim 39.

46. An isolated polypeptide which is encoded by a nucleotide sequence according to any one of claims 1 to 17.

47. A polypeptide according to claim 46 which comprises an amino acid sequence which consists of the sequence of SEQ ID Nos. 2, 5 or 8.

48. A polypeptide according to claim 46 which is a fragment of a polypeptide of claim 47.

49. An isolated polypeptide which consists of the sequence of SEQ ID Nos. 2, 5 or 8.

50. An isolated polypeptide which is a fragment of a polypeptide according to claim 47 and which comprises at least 5 contiguous amino acids of that polypeptide.

51. A fragment according to claim 50 which comprises amino acids 90 to 111 (zinc finger motif), amino acids 63 to 132 (amino terminal region), amino acids 263 to 366 (carboxy terminus) or amino acids 263 to 328 (activation domain).

52. A fragment according to any one of claims 48 to 51 which is capable of affecting one or more physical characteristics of a plant expressing said fragment, the physical characteristics being selected from vernalization response, flowering time, leaf size and/or shape or shade avoidance response.

53. An isolated nucleic acid which encodes for a fragment according to claim 50 or claim 51, or claim 52 as dependent therefrom.

54. An isolated nucleic acid which is the complement of the nucleic acid of claim 53.

55. A method of making the polypeptide of any one of claims 46 to 52, which method comprises the step of causing or allowing expression from a nucleic acid of any one of claims 1 to 17 or 53 in a suitable host cell.

56. An antibody which has specific binding affinity for a polypeptide according to any one of claims 46 to 52.

57. A polypeptide which comprises the antigen-binding site of the antibody of claim 56.

58. A method for affecting a physical characteristic of a plant selected from vernalization response, flowering time, leaf size and/or shape or shade avoidance response, which method comprises either the step of:

(i) causing or allowing transcription from a nucleic acid according to claim 17 or claim 54 in the plant; or

(ii) causing or allowing transcription from a nucleic acid according to any one of claims 1 to 16 or claim 53.

59. A method according to claim 58 which method comprises causing or allowing transcription from a nucleic acid according to any one of claims 1 to 16 or claim 53 thereby to reduce VRN2 expression by co-suppression.

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